

interval stage height readings accumulated by electronic data loggers at these two locations, USGS was able to compute 1) stormwater flow into the detention pond, 2) discharge from the pond through the perforated riser outlet, and 3) bypass flow over the spillway when the pond filled. Finally, a tipping bucket rain gage measured the rainfall rate during each storm. The instrument was a Weathermeasure Model 6010 gage with a 0.25 mm (0.01 in) sensitivity connected to a Stevens Model 6113 event recorder.

For each pollutant two treatment efficiencies were determined. The first is "pond treatment efficiency" (PTE), which is the percentage of contaminant load removed from the runoff that is actually detained in the pond.

$$\text{PTE} = [ ((\text{LI} - \text{SP}) - \text{PR}) \times (100) ] / [\text{LI} - \text{SP}],$$

where LI is the total runoff load, SP is the runoff load that bypassed treatment via discharge over the spillway, and PR is the treated load discharged through the perforated riser. The "storm treatment efficiency" (STE) is a measure of the percentage of contaminant load removed from the runoff, regardless of whether it was detained in the pond or bypassed the pond via the spillway. The STE is computed as:

$$\text{STE} = [ (\text{LI} - (\text{PR} + \text{SP})) \times (100) ] / [\text{LI}].$$

Note that PTE and STE differ from one another only for storms large enough to produce spillway bypassing. In those cases, STE will be smaller than PTE.

Storm pollutant loads (kg) entering and leaving the pond were estimated by summing 2-min incremental loadings which were the products of flows ( $\text{m}^3/\text{sec}$ ) and concentrations ( $\text{mg}/\text{l}$ ). The flow readings were more frequent than the concentration measurements; hence linear interpolation was done to provide the missing concentrations. Losses over the spillway were based on pollutant concentrations measured at the pond inlet, since it was assumed that these losses represented a short-circuiting of the treatment process. All loading computations were made using an Excel Version 5.0 spreadsheet.

### **Settling Column Tests**

There were four laboratory settling column experiments, using runoff water from storm events on 4 December 1991, and 19 May, 4 August, and 12 August 1992. Grab samples were collected manually at the pond inlet structure approximately when runoff peaked because this was when TSS concentrations were expected to be greatest. In the laboratory, the samples sat long enough to temperature equilibrate to 21°C before being mixed thoroughly and poured into the settling column. The column was a 30.5 cm (12 in) diameter by 142 cm (56 in) tall section of plastic pipe, closed at the bottom and open at the top. Sampling ports were built into the column at 15 cm (6